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Mainstreaming climate adaptation in Switzerland: How the national adaptation strategy is implemented differently across sectors

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ABSTRACT

Due to few comparative studies, explanations for differences in adaptation mainstreaming between sectors remain widely unclear. The article analyzes how adaptation mainstreaming was approached during the development of the Swiss National Adaptation Strategy and to what extent adaptation objectives were mainstreamed into sectoral policies. The analysis reveals that in Switzerland, adaptation objectives are integrated more substantially into sectoral policies when they overlap with primary sectoral objectives but generally backing by organizational and procedural measures is lacking. The results suggest a similar pattern for adaptation mainstreaming as for EPI: While policy frameworks such as strategies are adopted rather easily, a move towards more binding measures that interfere with sectoral policy-making and the existing institutional structure is much more challenging. In contrast to environmental concerns, climate change impacts are expected to be considered more substantially resulting in a more substantive mainstreaming of adaptation objectives and measures on a sectoral level. As these measures might negatively affect other sectors, the main challenge of adaptation mainstreaming is to consistently address the cross-cutting nature of adaption and to establish procedures to coordinate sectoral measures in order to avoid such negative externalities.

1. Introduction

Concerns over the severe impacts of climate change have increased worldwide within the last decade. Hence, adaptation to climate change impacts is regarded as an "inevitable reaction to climate change" (De Gier et al., 2009: 32) by most governments. In this scope, adaptation mainstreaming (or the integration of climate change adaptation policy) has now become a specific focus of both public officials and scientific experts. Adaptation mainstreaming is, in general terms, referred to as taking into account climate change adaptation policy objectives in other policies and to recognize and address inconsistencies (Brouwer et al., 2013; Swart et al., 2009). Previous studies have provided overviews of how governments (intend to) tackle climate change (Bauer et al., 2012; Biesbroek et al., 2010; Swart et al., 2009). These studies basically reveal that adaptation mainstreaming is widely accepted as a policy principle but provide only very general information on how adaptation mainstreaming is adopted in different sectoral contexts. Although focusing on mitigation, studies on Climate Policy Integration indicate for adaptation mainstreaming substantial variance regarding the implementation of adaptation measures, priorities, and the perception of potential conflicts and synergies across countries and sectors (Mickwitz et al., 2009; Van Bommel and Kuindersma, 2008). Moreover, it has been suggested that adaptation mainstreaming may manifest in very different approaches in different sectors (Persson and Klein, 2009) which was corroborated by a more recent review study (see the overview in Runhaar et al., 2017). Despite a broad range of empirical studies on climate adaptation mainstreaming, comparative analyses have received only limited attention (Persson et al. this issue). Thus, it is still an open question how adaptation mainstreaming is addressed in a broad variety of sectors, how such differences could be explained, and how issues of coherence, synergies, and contradictions between sectors are addressed.

This paper contributes to this debate by addressing the following question: How has adaptation mainstreaming been addressed in the development of the Swiss National Adaptation Strategy and the sectoral strategies, respectively, and how can different levels of adaptation mainstreaming in the sectors be explained? Switzerland can be considered as a typical example in its approach to adaptation mainstreaming. As in other countries, adaptation mainstreaming is considered as a key element in National Adaptation Strategies—the prevailing approach to climate change adaptation governance (Bauer et al., 2012; Biesbroek et al., 2010; EEA, 2014). In this context, adaptation mainstreaming is mainly promoted top-down by the executive branch of government but lacks strong formal requirements or a strong

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regulatory framework (Swart et al., 2009). Focusing on one country and on the activities related to its National Adaptation Strategy (NAS), the subsequent analysis aims to control for the institutional context and can therefore identify key factors affecting the level of mainstreaming between sectors. Thus, the Swiss case can also have implications beyond its national context, in particular for states that approach adaptation mainstreaming for a broad range of sectors by a NAS and with similar characteristics of the involved sectors. However, limitations of this research strategy occur on the one side regarding a different government architecture in terms of departments and agencies responsible for sectoral policy-making and, on the other side, by the strong sectoral approach in Swiss policy-making (Kriesi and Trechsel, 2008) in contrast to joined-up approaches (Bogdanor, 2005).

The paper is structured in the following manner. Adopting concepts and approaches that have been developed in the more extensive Environmental Policy Integration (EPI) literature, a framework for the empirical analyses of adaptation mainstreaming is developed. Its applicability is then illustrated by analyzing how adaptation mainstreaming was adopted during the development of the Swiss NAS. The paper concludes with some recommendations regarding the future analysis of adaptation mainstreaming and for further enhancing adaptation mainstreaming.

2. Analytical framework

A majority of studies and reports suggests a conceptual similarity between EPI and adaptation mainstreaming (e.g., Brouwer et al., 2013; Gupta and Van Der Grijp, 2010; Mickwitz et al., 2009; Nilsson and Nilsson, 2005; Runhaar et al., 2017; Runhaar et al., 2014; Swart et al., 2009). Many scholars have adopted the “principled priority” conceptualization for EPI by Lafferty and Hovden (2003), though others rather follow the “rational” interpretation (Adelle and Russel, 2013). These (or very similar) concepts have also been used to distinguish between different levels of integration or mainstreaming for empirical studies (Adelle and Russel, 2013; Brouwer et al., 2013; Jordan and Lenschow, 2008, 2010). Regarding the threefold typology “coordination” refers to avoiding contradictory sectoral policies or compensating for adverse consequences for other policies and is considered as initial starting point, “harmonization”—aiming at bringing adaptation objectives on equal terms of—implies a more substantial level of mainstreaming. Finally, “prioritization” aims at a more fundamental change and therefore a “strong” level (see Persson et al. this issue; Runhaar et al., 2014). Table 1 provides an overview of the three concepts, their key characteristics, and the implications for the level of adaptation mainstreaming.

Assessing different levels of mainstreaming or integration has been the main challenge in the study of policy integration and mainstreaming (Candel and Biesbroeck, 2016; Runhaar et al., 2017). Previous studies referred to the analysis of particular policy measures (Jordan and Lenschow, 2008). On the one hand, several studies suggest that the more measures are adopted, the higher the level of mainstreaming or integration (Briassoulis, 2005; Lafferty and Hovden, 2003; OECD, 2002; Swart et al., 2009). On the other hand, it has been emphasized that only measures that challenge and alter the institutional structure (e.g., mandatory consultation, veto rights) indicate higher levels (Jacob et al., 2008). Following Persson (2004), three different approaches to categorize such measures distinguished: (1) normative, (2) organizational, and (3) procedural (Jacob et al., 2008; Jordan, 2002; Jordan and Lenschow, 2008). Subsequently, each approach is briefly discussed with a specific focus on the corresponding adaptation mainstreaming measures (an overview is presented in Table 2 below; for the need of adopting the framework to the integration problem under study see Candel and Biesbroeck, 2016). While Wamsler and Pauleit (2016) propose a different categorization, the various measures are covered by both categorizations.

The normative approach refers to the development of strategies, high-level commitments, or adjustments in laws or constituencies. It is expected that such measures initiate further reform efforts, provide guidance and leadership for policy-making, or support implementation. Regarding the normative approach, adaptation frameworks such as national adaptation strategies or action plans still play a key role in climate change adaptation policy-making (Bauer et al., 2012; Biesbroek et al., 2010; Swart et al., 2009).

The organizational approach addresses the governmental and administrative structure (Jacob et al., 2008). It entails the size of staff, the allocation of financial resources, the establishment of specialized units across departments, the establishment of interdepartmental units, and stakeholder interaction. For adaptation mainstreaming mainly the establishment of adaptation units across departments, the coordination of organizations, interdepartmental information exchange and cooperation platforms, staff training, and stakeholder workshops have been proposed (Bauer et al., 2012; Persson and Klein, 2009; Swart et al., 2009).

Finally, the procedural approach intends to alter current decision-making and information exchange procedures. On the one hand, it includes altering the institutional rules in the political system, such as establishing interdepartmental cooperation, consultation, or veto rights. On the other hand, the procedural approach entails adjustments to existing or the implementation of new instruments across sectors, and new or modified reporting and monitoring practices (Candel and Biesbroeck, 2016). As climate change adaptation is framed as a policy problem that should be addressed in established sectoral policies, the use of existing routine institutional procedures (e.g., interdepartmental consultation) has been prominently suggested (e.g., Bauer et al., 2012; Dovers and Hezri, 2010; Swart et al., 2009). Moreover, a broad variety of specific adaptation instruments were developed. Among those instruments are climate change screening, climate risk screening, climate proofing, climate risk management, vulnerability assessments, and various guidance tools (OECD, 2009; Olhoff and Schaer, 2010; Persson and Klein, 2009; UNDP-UNEP, 2011).

Analyzing adaptation mainstreaming according to the three approaches implies that normative measures indicate lower levels, and organizational and procedural measures higher levels of mainstreaming. However, Jacob et al. (2008) argue that—in the case of EPI—this may be misleading due to the often fairly undemanding design of procedural and organizational measures (see also Candel and Biesbroeck, 2016). Similar design issues have been reported for adaptation mainstreaming measures. For instance, procedural measures are often established only on a voluntary and temporary basis (Bauer et al., 2012). Thus, a framework for the analysis of adaptation mainstreaming has to assess each measure regarding its implications for the level of mainstraming. Subsequently, selected measures and their consequences

Table 1
Typology of adaptation mainstreaming.

Concept	Coordination	Harmonization	Prioritization
Key characteristics	Cross-sectoral coordination to avoid contradictions and negative spillovers and to realize synergies.	Inclusion of climate change adaptation objectives on equal terms with sectoral objectives.	Favoring adaptation objectives over sectoral policies; redesign and reorganization of policies and decision-making processes from the perspective of climate change adaptation.
Level	weak	medium	strong

Table 2
Framework for the analysis of adaptation mainstreaming.

	Measures	Coordination	Harmonization	Prioritization
Normative approach	a) Overall adaptation policy framework (strategy, action plan)	a) Adaptation policy framework such as a strategy or action plan is adopted; addresses possible impacts and vulnerabilities, outlines general objectives; adaptation is recognized as key issue for policy-making;	a) Adaptation policy framework such as a strategy or action plan is adopted; coordination across sectors; outlines further course of action including measures and timeframes;	a) Adaptation policy framework such as a strategy or action plan is adopted; binding timetables and targets are included; adaptation is established as guiding objective for all policy-making; regular updates;
	b) Sectoral adaptation strategies	b) Sectoral adaptation strategies are established on a voluntary basis; addresses possible impacts and vulnerabilities;	b) Adaptation strategies are developed in key sectors and coordinated across sectors;	b) Adaptation is systematically included in sectoral strategies as guiding objective;
	c) Legal framework	c) Identification of selected adaptation relevant laws; selected minor legal adjustments including adaptation as objective;	c) Coordination is included in legal adjustments; coordination of legal revisions;	c) Systematic inclusion of adaptation in legal frameworks; overarching binding legal framework for adaptation;
Organizational approach	a) Mandate and resources	a) Mandate to a leading department is assigned; no or very limited additional resources for adaptation;	a) Mandate to a leading department is assigned; additional resources mainly for coordination tasks;	a) Mandate to a leading department is assigned; substantial financial resources; agenda-setting possibilities and veto rights;
	b) Interdepartmental information exchange and coordination bodies	b) Interdepartmental information exchange bodies are established on a voluntary and temporary basis;	b) Interdepartmental information exchange and coordination bodies are established;	b) Interdepartmental information exchange and coordination bodies are institutionalized; joint staff training;
	c) Sectoral units	c) Adaptation is added to the sectoral task portfolio; no adaptation units are established;	c) Adaptation is added to the sectoral task portfolio; adaptation units are established in key sectors;	c) Complementary adaptation units across departments; selected merger of departments;
Procedural approach I (instruments)	a) Campaigns and research	a) Occasionally awareness raising campaigns and research projects are initiated;	a) Awareness raising campaigns and research projects are established and coordinated;	a) Institutionalized awareness raising campaigns and research projects;
	b) Vulnerability assessments	b) Selected vulnerability assessments;	b) Systematic vulnerability assessments following a standard procedure;	b) Systematic vulnerability assessments following a standard procedure and guide policy-making; priorities are decided;
	c) New instruments, adjusting existing instruments	c) New instruments are discussed and conceptualized; selected existing instruments are adjusted;	c) New instruments (e.g., climate change screening, climate risk screening, climate proofing, climate risk management, guidance tools) are designed, implemented and coordinated among the affected sectors; adjustments of existing instruments are coordinated;	c) New instruments (e.g., climate change screening, climate risk screening, climate proofing, climate risk management, guidance tools) implemented systematically; joint decision-making of affected sectors;
	d) Monitoring and reporting practices	d) Monitoring and reporting practices are discussed and outlined (sector-specific);	d) Monitoring and reporting practices are established and coordinated;	d) A consistent overall monitoring and reporting system is adopted;
Procedural approach II (institutional adjustment)	a) Communication and information exchange	a) Communication and information exchange processes on an informal and voluntary basis;	a) Communication and information exchange processes established and coordinated;	a) Communication and information exchange institutionalized;
	b) Interdepartmental consultation and cooperation	b) Voluntary interdepartmental consultation and cooperation;	b) Coordinated processes of interdepartmental consultation and cooperation;	b) Formally required interdepartmental consultation and cooperation including conflict mediation mechanisms;
	c) Interfaces (contradictions and synergies)	c) Selected potential contradictions and synergies are identified from a sectoral perspective;	c) Systematic identification of potential contradictions and synergies; coordination mechanisms are promoted to achieve coherence and synergies; main responsibility for interfaces is assigned to a single sectoral unit with substantial participation of affected sectors;	c) Systematic identification of potential contradictions and synergies; priorities are decided; joint responsibilities for all interfaces;
	d) Inclusion of non-governmental and subnational actors	d) Occasional consultation of non-governmental actors and subnational authorities;	d) Regular participative processes with non-governmental actors and subnational authorities;	d) Inclusion of non-governmental actors and subnational authorities into decision-making;

for the level of adaptation mainstreaming are discussed. In general, "coordination" entails non-binding measures with limited additional resources such as the identification of contradictions and synergies or interdepartmental consultation on a voluntary basis. "Harmonization" implies a stronger political commitment to tackle adaptation. For instance, adaptation is added as a sectoral objective and communication and information exchange processes are established on a regular basis both within and across sectors. Even more ambitious is "prioritization." It aims at a change of the current hierarchy of policy objectives from the perspective of adaptation. Thus, adaptation becomes the guiding objective for policy-making, interdepartmental cooperation is formally required and conflict mediation mechanisms are established. Table 2 provides an overview of the different measures related to the threefold typology.

This paper argues that in absence of strong formal requirements of a National Adaptation Strategy or a strong regulatory context, inconsistent adaptation mainstreaming is expected. As a consequence, selected sectors are expected to add adaptation to their sectoral agenda but coordination across sectors and cross-cutting measures will remain mostly absent.

3. Data and method

Although currently on the local level increasingly projects with an adaptation focus are implemented (e.g., Wamsler and Pauleit, 2016), National Adaptation Strategies are still the main approach to climate change adaptation policy (Bauer et al., 2012; Bauer and Steurer, 2015). These strategies summarize the current state of adaptation policy and outline further action. Their analysis can reveal past, current, and planned measures regarding adaptation mainstreaming. Therefore, the process of developing the Swiss NAS and the respective sectoral strategies is analyzed as a case study. The NAS process in Switzerland covered the period between August 26, 2009, (mandate for developing the NAS) and April 9, 2014 (adoption of the second part of the NAS). It extends until the publication of a report on pilot projects (October 17, 2017) which is considered a part of the NAS process.

To identify the measures for adaptation mainstreaming, data were collected based on a qualitative analysis of official documents from the NAS process. The analyzed documents include the Swiss National Adaptation Strategy (part 1 and 2), an intermediary report, and the sectoral strategies and reports of the participating sectors, respectively. An overview of the selected sectors, the responsible federal offices, their department affiliation, and the analyzed documents is presented in Table 3.

Following the approach of Mayring (2000) for qualitative document analysis, the unit of analysis defines the particular sections within the documents to be analyzed. The unit of analysis is therefore defined in every section, which addresses the measures for taking into account climate change adaptation policy objectives in other policies and recognizing and addressing inconsistencies. As sections can contain information on more than one measure, multiple coding was allowed. The distinction between normative, organizational, and the two procedural approaches follows the previously outlined framework (Table 2). In order to identify different levels, these sections are then assessed following the method of structured scaling. The scale is ordinal and follows the three levels outlined previously (see Table 1). "Coordination" refers to general recommendations and statements, voluntary measures, coordination activities, and/or the mere reference to adaptation objectives. "Harmonization" is reserved for adaptation mainstreaming aiming at the establishment of coherence and mutual support. Finally, "prioritization" includes measures aiming at a fundamental change of policy objectives giving adaptation precedence, a consistent implementation of binding and demanding measures etc.

4. Case analysis

The first and second part of the Swiss NAS address the goals, challenges, fields of action, as well as measures and activities. They include sustainability, cooperation among various governmental and non-governmental actors, coherence with climate change mitigation, continuous progress evaluation, and updates according to new developments as key objectives. However, coordination is a key issue throughout the NAS. Specifically, it is stressed regarding the development of the sectoral strategies (e.g., standardized procedures), to identify potential synergies and conflicts across sectors, and for the implementation of subsequent adaptation measures. Moreover, progress reports for the sectoral strategies were expected during the development of the NAS itself, which indicates substantial coordination by the FOEN (Federal Office for the Environment) during the process. In terms of the normative-approach, the overall adaptation framework implies adaptation mainstreaming according to "coordination."

During the development of the NAS, relevant laws have been identified across the sectors and potential adjustments discussed. However, these recommendations remain mostly on a rather general level. Moreover, adjustments to these legal frameworks should then be initiated from the particular sectors. A revision of the CO_2 act was launched in August 2009 and was adopted by both chambers of the Swiss parliament in December 2011. In article eight of the revised CO_2 act, the Federal Council officially gains the authority to coordinate adaptation activities and to engage in the development of adaptation measures. Moreover, in article 15, the FOEN is now officially mandated as a coordinating body. Thus, these legal adjustments qualify as between the levels of "coordination" and "harmonization" of adaptation mainstreaming.

Regarding the organizational approach the NAS indicates several measures. Although a leading department (FOEN) has been established, its authority and resources are strongly limited. The coordinating mandate was executed by the section for Climate Change Reporting and Adaptation—a rather small unit consisting of only eight permanent staff members (additional need for staff is explicitly requested in the second part of the NAS). However, the mandate by the Federal Council can be interpreted as a commitment for advancing the agenda of climate change policy adaptation. The main responsibility for developing the sectoral strategies was assigned to the respective federal offices. The Interdepartmental Board on Climate (IDA Klima)—led by the FOEN but including ten additional federal offices—was mandated to coordinate the basic activities between the involved departments and their respective offices. Thus, here adaptation mainstreaming falls somewhere between "coordination" and "harmonization."

The task of developing a sectoral adaptation strategy was explicitly mandated for nine sectors and their representing agencies thus adding adaptation to the sectoral task portfolio. Except for the FOEN, no particular adaptation units have been established so far. The task of developing a sectoral adaptation strategy was mainly carried out by existing staff members with no particular adaptation focus. However, the second part of the NAS demands for a substantial increase mostly in financial resources but also staff members.

In terms of procedural instruments several smaller research projects have been initiated, for instance, on European adaptation action plans (Karlegger et al., 2010) or on ongoing adaptation activities in the Swiss cantons (Bättig et al., 2010), guidelines for regional adaptation (FOEN, 2015) as well as an overview of (successful) pilot projects (FOEN, 2017). For several sectors the second part of the NAS emphasizes the need for awareness raising and research projects in the different sectors but adaptation mainstreaming goes barely beyond "coordination" thus far. In contrast, challenges and vulnerabilities are addressed throughout the NAS for the included sectors and follow a consistent procedure, hence implying a "harmonization" level.

The first part of the NAS makes only very few and very general references to new instruments or concrete measures, while the second

Table 3
Participating sectors, offices in charge, and analyzed documents.

Sector	Offices in charge	Department affiliation	Adaptation strategies	Reports
Climate change adaptation	Federal Office for the Environment (FOEN)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland – Goals, challenges and fields of action. First part of the Federal Council's strategy (FOEN, 2012a); Adaptation to climate change in Switzerland – Action Plan 2014–2019. Second part of the Federal Council's strategy (FOEN, 2014)	Intermediary report on the NAS to the attention of the Federal Council (FOEN, 2010) Report on pilot projects (FOEN, 2017)
Spatial planning	Federal Office for Spatial Development (ARE)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland in the sector of spatial planning (ARE, 2011)	–
Energy	Swiss Federal Office of Energy (SFOE)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland in the energy sector (FOE, 2012)	–
Natural hazards	Federal Office for the Environment (FOEN)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland in the sector of natural hazards (FOEN, 2012c)	–
Biodiversity	Federal Office for the Environment (FOEN)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland in the biodiversity management sector (FOEN, 2011a)	–
Forestry	Federal Office for the Environment (FOEN)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland in the forestry sector (FOEN, 2011b)	–
Agriculture	Federal Office for Agriculture (FOAG)	Federal Department of Economic Affairs, Education and Research (EAER)	Climate strategy agriculture (FOAG, 2011)	–
Water	Federal Office for the Environment (FOEN)	Department of the Environment, Transport, Energy and Communications (DETEC)	Adaptation to climate change in Switzerland in the sector of water economy (FOEN, 2012b)	–
Tourism	State Secretariat for Economic Affairs (SECO)	Federal Department of Economic Affairs, Education and Research (EAER)	–	Swiss Tourism and Climate Change – Impacts and Options for Adaptation (SECO and Forschungszentrum für Tourismus Universität Bern, 2011)
Civil Protection	Federal Office for Civil Protection (FOCP)	Federal Department of Defense, Civil Protection and Sports (DDPS)	–	Climate Change and Civil Protection (FOCP, 2009)
Health	Federal Office for Public Health (FOPH); Federal Food Safety and Veterinary Office (FSVO)	Federal Department of Home Affairs (FDHA)	–	–
Meteorology/ Climatology	Federal Office of Meteorology and Climatology (SwissMeteo)	Federal Department of Home Affairs (FDHA)	–	–
Finance	Federal Finance Administration (FFA)	Federal Department of Finance (FDF)	–	–

part is more specific but still refers to them as an overview of ongoing and planned activities. However, from the 63 measures in the second part of the NAS, only 9 are explicitly inter-sectoral. Some more concrete plans for measures are outlined for the following sectors: water, natural hazards, forestry, energy, tourism, biodiversity, health, and spatial planning. Most of them refer to pilot projects and reviews and modifications of existing instruments, consulting tasks, additional research projects, establishing guidelines/principles, communications, and awareness raising campaigns. Furthermore, a reporting and information system of adaptation projects was established. In 2017 a report was published involving seven different departments that summarizes 31 pilot projects of which a majority has an inter-sectoral focus (FOEN, 2017). Thus, over time a level of adaptation mainstreaming corresponding to "coordination" was achieved here in terms of establishing a more cooperative approach among the involved sectors in selected projects.

Institutional adjustments regarding procedures do not appear prominently so far. Activities on information provision are reported on several occasions. These activities have been initiated by the adaptation unit of the FOEN. However, they seem to occur only occasionally and participation is voluntary. Consultation and cooperation have been carried out mainly through the IDA Klima. However, no detailed information is available on this subject. Potential contradictions and synergies are extensively addressed in Chapter 5 of the NAS (first part), which focuses on interdependencies through the identification of 47 interfaces. However, how these contradictions will be minimized and how synergies will be achieved shall be addressed only at a later stage of the NAS process. While cooperation across the involved sectors is suggested and the relevant federal offices are identified in the second part of the NAS, it remains mostly unclear how it is achieved. In several cases some sort of bilateral or multi-departmental collaboration through established channels is mentioned, in others reference is made to the interdepartmental exchange body IDA Klima.

As discussed previously, the NAS process was strongly coordinated across sectors, implying adaptation mainstreaming according to "coordination." Ten sectors were mandated by the FOEN to develop a sectoral strategy for climate change adaptation and to report key areas affected by climate change, assess climate sensitivity, and determine the need for potential action. However, the majority was developed by offices in the Federal Department of the Environment, Transport, Energy and Communications (DETEC). These strategies are strongly coherent and follow the same chapter structure. The strategy for agriculture and the report for tourism—both located in the Federal Department of Economic Affairs, Education and Research—substantially differ with respect to structure and content. A report for civil protection was published prior to the development of the NAS. Thus, the report does not follow the overall structure. Although adaptation mainstreaming can be assessed according to "coordination," it seems to be weaker in offices that are not affiliated to the Federal Department of the Environment, Transport, Energy and Communications.

Regarding the inclusion of adaptation to the task portfolio, all sectoral strategies and reports included adaptation objectives. However, traditional sectoral goals (e.g., economic growth for tourism) prevail. While some explicitly superimpose their sectoral objectives onto their adaptation objectives, this is done implicitly in most cases, usually by referring to a careful monitoring of climate change that could harm the ongoing activities. Due to a strong mutual overlap with sectoral goals, in the cases of forestry, spatial planning, biodiversity, and agriculture, climate change adaptation considerations are explicitly taken on board. Moreover, forestry, natural hazards, and biodiversity have already embedded adaptation as a guiding sectoral objective into their recently revised sectoral strategies.

Regarding the organizational approach, all strategies and reports acknowledge the FOEN as the leading department and acknowledge the mandate to participate in the NAS process. Moreover, all participating departments are represented in the interdepartmental exchange body IDA Klima. As was already mentioned, only one particular and rather small unit for climate change adaptation exists within the FOEN. In all other federal offices and agencies (including the FOEN), no particular unit for climate change adaptation has yet been established. In most cases, the tasks associated with the development of the NAS and the sectoral strategies were completed by the regular offices and agencies involving three to seven staff members. The strategy for tourism was prepared by the Research Institute for Recreation and Tourism of the University of Bern, and for natural hazards, biodiversity, and water, substantial involvement of external experts is indicated.

Several sectors are now initiating and conducting additional research activities to better understand climate change and its impacts. These activities focus on particular sectoral demands while for forestry, energy, biodiversity, water, and agriculture additional coordination is explicitly demanded. Regarding the identification and assessment of climate vulnerabilities most sectoral strategies follow the same structure to identify and assess climate impacts. Within the strategy for agriculture, a slightly different approach was adopted. The reports for civil protection and tourism also follow a particular approach. However, for the NAS, all key sectors provided consistent information following the standard procedure proposed by the FOEN.

All sectors extensively outline ideas for new instruments and measures. These are, however, still in a very preliminary stage, mostly express a sectoral perspective and, except for biodiversity, hardly address other affected sectors or coordination. Slightly more concrete are the adjustments of already existing instruments. While some of these instruments are already being implemented (i.e., in the forestry and natural hazards sectors), the vast majority are still in the "brainstorming stage." Several strategies express the need for establishing or altering existing monitoring systems and reporting practices. With the exception of the biodiversity strategy, these intentions typically outline sectoral demands, and intentions for coordination are barely expressed. More recently 31 pilot projects that involve several sectors were presented in a report (FOEN, 2017).

Consultation and coordination across departments beyond the meetings and workshops with the project lead seem to be an exception. However, for civil protection, biodiversity, and agriculture, more extensive exchange and consultation processes are reported in order to develop the respective strategies and reports. In contrast to the NAS, interdependencies and interfaces are addressed only occasionally in the sectoral strategies. The major focus concerns negative side effects for the particular sector. Occasionally, potential synergetic interfaces have been identified (i.e., between forestry and natural hazards and between biodiversity and forestry). Interestingly, such interdependencies are realized very differently. For instance, biodiversity identifies interfaces with all sectors which are barely echoed in the respective sectoral strategies. In general, the focus is on the particular sectoral concerns and demands.

5. Discussion

The analysis of adaptation mainstreaming indicates that the process for developing the Swiss NAS resulted in adaptation mainstreaming in key sectors, although to varying degrees. With respect to the normative-communicative approach, mostly a "coordination" level of adaptation mainstreaming was achieved regarding the fact that the majority of the participating sectors developed a strategy or report. As all involved sectors provided consistent information for the NAS, even "harmonization" resulted. The revision of the CO_2 act indicates a major step for adaptation mainstreaming as it legally supports coordination. However, this legislation provides no strong formal requirements or a strong regulation for adaptation in general and adaptation mainstreaming in particular. Although many sectoral laws have been identified for potential readjustments and some selected adjustments are targeted for the revision of the forestry act, thus far, adaptation has not been

included in these specific sectoral laws. Even though adaptation has been included in the sectoral strategies and action plans for natural hazards, forestry, biodiversity, and agriculture, coordination remains absent. In particular natural hazard and forestry seem to consider adaptation increasingly on equal terms with other sectoral policy objectives while in the other sectors it is still considered to be of comparatively minor importance. This result suggests that adaptation is integrated more substantially if it supports or overlaps with sectoral objectives and a long term sectoral perspective. As climate impacts might undermine key objectives of a broader range of sectors, further adaptation mainstreaming could be expected. However, whether this is from a strictly sectoral perspective or involves coordination among sectors remains an open question.

A major gap seems to exist regarding the implementation of new instruments. So far, ideas are merely outlined on a conceptual level, refer to research projects or to a though increasing number of pilot projects. In the case of biodiversity, the seven measures mentioned in the NAS, however, have even "disappeared," that is they are not mentioned in most recent action plan adopted in autumn 2017. Another substantial deficiency can be identified at the organizational level. With the exception of the rather small unit located in the FOEN, no specific adaptation unit in the federal administration exists. Similar empirical results have been reported in previous studies (Bauer et al., 2012; Brouwer et al., 2013; Swart et al., 2009). Almost ten years ago Swart et al. (2009) attributed these results to the early stage of climate change adaptation policy suggesting that progress in adaptation seems to be rather slow (see also Runhaar et al., 2017).

Despite the lack of a strong regulatory context, a substantial level of coordination was achieved in the development of the NAS. However, the evidence suggests that coordination across departments remains challenging. In contrast to the agencies located in the FOEN, the sectoral adaptation strategies developed in other departments substantially differ in their structure and content. Moreover, although the responsibilities assigned to address the interfaces further were mainly allocated to the FOEN, some assignments seem to be the result of interest politics. The interface of water and agriculture, for instance, is the exclusive responsibility of the Federal Office of Agriculture. It is questionable that the current structure and limited authority of the leading department is appropriate for solving potential conflicts at the interfaces. Thus subsystem involvement and interaction could be strengthened through additional coordinative instruments at the system-level (Candel and Biesbroeck, 2016).

Adaptation mainstreaming is slightly further developed in selected sectors. Several sectors have addressed climate change adaptation prior to the NAS process and included adaptation as a key objective in their sectoral strategies. Thus, in selected sectors—namely natural hazards, forestry, spatial planning, and to some extent biodiversity—adaptation mainstreaming according to the "harmonization" criterion was achieved in terms of diversification of objectives but without or only little recognition of their cross-cutting nature (Candel and Biesbroeck, 2016). The analysis indicates several enabling factors and barriers that have been identified in previous studies (see Runhaar et al., 2017 for an overview). The limited financial and personal resources, conflicting interests across sectors, varying degrees of cooperation across offices and departments, and a need for additional knowledge seem crucial inhibiting factors. Given the absence of strong legal requirements and leadership, the main driver for mainstreaming adaptation seems to be the (perceived) overlap of sectoral and adaptation goals in Switzerland resulting in varying levels of adaptation mainstreaming across the involved sectors. This indicates that a "coordinated" or "harmonized" adaptation mainstreaming is a particularly complex task in democratic states with well-established actors and interests involved in sectoral policy-making such as Switzerland. This might be less challenging in states with a tradition of more joined-up policy-making such as for instance the U.K. (Bogdanor, 2005).

6. Conclusion

Previous studies interpret adaptation mainstreaming as inclusion of climate change adaptation objectives, as a process of coordination to avoid contradictions and negative effects between different policies and to realize synergies, and as a redesign and reorganization of policies and decision-making processes from the perspective of climate change adaptation. Thus, they mirror previous understandings of EPI (Adelle and Russel, 2013; Jordan and Lenschow, 2008; Persson, 2004). The measures that have been suggested for implementing adaptation mainstreaming follow the same approaches as for EPI—normative, organizational, and procedural. This similarity results from the strong role of EPI as a source of inspiration for adaptation mainstreaming (Adelle and Russel, 2013).

The framework for analyzing adaptation mainstreaming as a governing process developed in this paper focuses on the analysis of measures as has been suggested by previous EPI studies (e.g., Jacob et al., 2008). In addition to analyzing measures along the three approaches, it takes into account that each measure can be designed according to different levels of ambition. While including several measures from various approaches in the same framework provides an improvement regarding the analysis of the overall level of policy integration, it has some limitations. In contrast to the detailed study of a single measure, it can account only for major differences among the analyzed measures. In the current framework, only three levels—coordination, harmonization, and prioritization—were distinguished, which insufficiently accounts for more subtle differences. Thus, further research in both EPI and adaptation mainstreaming should particularly focus on the development of more detailed scales for assessing different policy integration measures and how they might be interrelated (e.g., as foundation for enhanced integration). As for adaptation mainstreaming the focus seems to be on "coordination" and "harmonization" rather than "prioritization", understanding such lower level measures and their effects seems crucial (for a similar argument see Candel and Biesbroeck, 2016).

Like other NAS, the Swiss NAS is the first step towards climate change adaptation policy in Switzerland. The first generation of NAS predominantly established processes that aimed at the activation and inclusion of relevant sector departments. The analysis of the Swiss NAS largely corroborates these findings and suggests that progress in adaptation seems to be rather slow (see also Runhaar et al., 2017). After eight years the process of activation and awareness rising is still ongoing and except for some pilot projects, the majority of measures and activities are to a large extent still addressed as declarations of intent. However, as the long history of EPI has shown, moving from declarations to measures that are more concrete and effectively challenge the institutional structure is difficult (e.g., Jordan and Lenschow, 2008). As the analysis shows, in contrast to environmental concerns, adapting to climate change is often considered to overlap substantially with the prevalent sectoral objectives. Given this "natural coherence" (see also Candel and Biesbroeck, 2016), conflicting goals as a major barrier for EPI (Runhaar et al., 2014) are mostly absent in the case of adaptation. However, as the example of biodiversity shows, cross-cutting policies might encounter strong challenges regarding the implementation of measures as they by definition interfere with other sectors. Nevertheless, it is plausible to assume that—in contrast to environmental concerns—climate change impacts will be considered more substantially resulting in a more substantive mainstreaming of adaptation objectives and measures on a sectoral level. As these measures might negatively affect other sectors, the main challenge of adaptation mainstreaming—and thus also the second generation of NAS—is to consistently address the cross-cutting nature of adaption and to establish formal requirements in particular for procedures to coordinate sectoral measures in order to avoid such negative externalities (see also Candel and Biesbroeck, 2016).

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